Lambda Deployment
- GMPLS -

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What is GMPLS?

- GMPLS stands for “Generalized MPLS”.
- GMPLS differs from traditional MPLS in that it supports multiple types of switching such as:
  - PSC : Packet Switch Capable
  - L2SC : Layer 2 Switch Capable
  - TDM : Time-Division Multiplex capable
  - LSC : Lambda Switch Capable
  - FSC : Fiber Switch Capable
MPLS Overview

- RSVP-TE signaling creates a forwarding table.
GMPLS - Forwarding

- GMPLS is similar to MPLS.
- For example, the label is lambda.

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Out lambda</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Z</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In lambda</th>
<th>Out lambda</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z</td>
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<td>pop</td>
</tr>
</tbody>
</table>
Extension from MPLS

- **Signaling**
  - RFC3473: GMPLS Signaling RSVP-TE Extensions

- **Routing**
  - Routing Extensions in Support of GMPLS
    - draft-ietf-ccamp-gmpls-routing (Status RFC Ed Queue)
  - OSPF Extensions in Support of GMPLS
    - draft-ietf-ccamp-ospf-gmpls-extensions (Status: RFC Ed Queue)

- **Link Management**
  - Link Management Protocol (LMP)
    - draft-ietf-ccamp-lmp (Status: RFC Ed Queue)
Calculate a route using OSPF

Establish LSPs

Create two LSPs
Routing: OSPF

- LSP path is calculated by using OSPF information in the head end.
- OSPF information has all network topology.
- This calculation is similar to MPLS.

Which path is better?

Which path is better for backup.
Routing: OSPF

- Difference from MPLS are:
  - draft-ietf-ospf-gmpls-extensions-12.txt
    - Link Local/Remote Identifiers
    - Link Protection Type
    - Interface Switching Capability Descriptor
    - Shared Risk Link Group
OSPF - Interface Switching Capability Descriptor

- Exchange Interface Switching Capability using OSPF opaque LSA
OSPF – Shared Risk Link Group

- “shared risk link group (SRLG)” if they share a resource whose failure may affect all links.
- For example, two fibers in the same conduit would be in the same SRLG.

Diagram:

Shared Rink Link Group
LMP – Link Management Protocol

- Two core procedure of LMP are:
  - control channel management
    - Config message exchange
    - fast keep-alive mechanism
  - link property correlation

- Optional procedure of LMP are:
  - Verifying Link Connectivity
  - Fault Management
LMP – Control Channel Management

- Establish control channel
- Maintain control channel connectivity

![Diagram of control channel management between A and B with Hello messages and numbered connections.]
LMP - link property correlation

- Exchange and verify for consistency the TE and data link information on both sides.
LMP – Verifying Link Connectivity

- To verify the physical connectivity of the data links and dynamically learn (i.e., discover) the TE link.
- The procedure SHOULD be done when establishing a TE link, and subsequently, on a periodic basis for all unallocated (free) data links of the TE link.

![Diagram showing the process of verifying link connectivity.](image)
LMP – Fault Management

Channel Status

Control channel

A

1 2 3 4 5 6 7 8

B

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Questions ?